

Docket No : POU920030185US1

Inventor : Richard C. Ferri et al  
Title : SUPPORTING ADAPTER FOR  
PORTABLE COMPUTER SYSTEM

APPLICATION FOR UNITED STATES  
LETTERS PATENT

"Express Mail" Mailing Label No.: ER 363647678 US  
Date of Deposit: November 19, 2003

I hereby certify that this paper is being deposited with the United States Postal Service as "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Name: Sandra L. Kilmer

Signature: Sandra L. Kilmer

INTERNATIONAL BUSINESS MACHINES CORPORATION

## **SUPPORTING ADAPTER FOR PORTABLE COMPUTER SYSTEM**

### **BACKGROUND OF THE INVENTION**

**[0001]** The present invention relates to a method and an apparatus for providing support to a computer system, and specifically to a portable computer system.

**[0002]** Portable computers such as mainstay laptop computers have changed the nature of conducting business. Teamed with the Internet and advances in communication technology, portable computers enable instant access to information from a variety of virtual office locations. Whether used in a make shift office at a remote visitor's center, on an airplane, at home or while traveling at a variety of customer locations, these portable computers allow their user to conduct business in the same manner as if in a traditional office setting. A variety of portable computers have been developed to meet the current needs of businesses. Portable computers include laptop computers (also commonly referred to as notebook computers, all of which are hereinafter identified as "laptop computers"), for example, those sold under the name ThinkPad® by International Business Machines Corporation, sub-notebook computers, personal digital assistants (PDA) and other hand-held computers. Laptop computers, however, have provided the most flexibility in conducting business in a similar way to that associated with a conventional office setting. This is because most laptop computers have many of the same performance characteristics as traditional desktop computers, but without the bulkiness of traditional desktop

computers. Even in a traditional office setting, many businesses opt to provide laptop computers to their employees in place of traditional desktop computers because of the advantages these systems provide. A laptop computer takes less space and can be stored easily, can be used in the office and can be transported easily for use in other environments such as conference rooms, classrooms, airports, airplanes and hotel rooms. Laptop computers can be transported and easily used in other environments, such as in field locations either indoors or outdoors, e.g. to manufacturing production floors and sites where scientific study, surveying, or construction are performed.

**[0003]** However, one difficulty in using portable computers, especially laptop computers in such locations, is to provide a way to support the weight of the computer, especially when traditional office space is not provided or available. When used in cramped or sparsely furnished offices, make shift environments such as airports, hotel rooms and such, the user must either support the computer in an uncomfortable position on his or her lap or use another surface such as a bed that is not positioned well or sufficiently secure to permit the freedom of movement necessary to use the keyboard and cursor positioning tool. In field locations, where the portable computer requires use in a standing position, heretofore only cumbersome, single purpose stands dedicated to supporting the computer have been provided in the prior art. Because of their dedicated purpose in supporting the computer, such stands must be transported in their entirety with the computer from place to place. In addition, in either such

environment, cables have to be attached and maintained to supply power and permit network access. However, such cables have a tendency to become tangled or loosen when dangling from points of attachment to a laptop computer supported by such stand.

**[0004]** Structures provided by the prior art for supporting laptop computers include single purpose stands with platforms having integrally attached legs or in which telescopic legs are attached to the portable computer device itself in one way or another. The problem with such structures is that they do not facilitate ease of transport and usability that has made laptop computers attractive in the first place. Users of the prior art supporting structures must specially fit the laptop computer to such stands and transport the entire stand having foldable or telescopic legs from place to place. If the user does not possess or wish to carry such single purpose stand, the user must forego the convenience of a supporting stand for the computer.

**[0005]** Accordingly an apparatus is needed as a component of a supporting structure for laptop or other portable computers, which does not require retrofitting the portable computer and which facilitates ease of transport.

## **SUMMARY OF THE INVENTION**

**[0006]** The present invention provides an adapter operable to support a computing device. The adapter includes a support plate. The support plate has a top surface and a bottom surface opposite the top surface. According to an aspect of the invention, a connector is provided from the bottom surface to removably mount the support plate to a support stand. A latch is provided from the top surface for securing a computing device to the support plate.

Alternatively, the connector is provided from a side surface of the support plate to removably mount the support plate to a cooperating support which is oriented in a substantially vertical direction.

**[0007]** According to another aspect of the invention, the adapter further includes a plurality of interior electrical connectors for mating with corresponding electrical connectors of the portable computing device. According to such aspect, the adapter has a plurality of exterior electrical connectors coupled to the interior electrical connectors. The exterior electrical connectors are adapted to mate with a plurality of corresponding cables, thereby connecting the electrical connectors of the portable computing device to the corresponding cables.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0008]** Figure 1 is a perspective view illustrating a support stand adapter according to an embodiment of the invention;

**[0009]** Figures 2A and 2B are bottom and top views, respectively, of the support stand adapter shown in Figure 1;

**[0010]** Figure 2C is an embodiment of the invention illustrating a side mounting support;

**[0011]** Figures 3A and 3B illustrate connector elements according to alternative embodiments of the adapter shown in Figures 1 through 2B; and

**[0012]** Figures 4A and 4B are front and rear perspective views of an embodiment of an adapter also functioning as a docking station or port replicator.

## **DETAILED DESCRIPTION**

**[0013]** Laptop computers and other portable computers are used instead of traditional desktop computers, not only on the desktop, but also away from the desk in a variety of environments. However, a drawback to the portability of such computers is that they are not easily supported in a comfortable position for use in non-office environments. Without the provision of a supporting surface, laptop

computers require placement on the user's lap for use in a sitting position, and require a stand for use in a standing position. These problems are addressed as follows. According to an embodiment of the invention, a supporting adapter is provided that attaches easily and securely to a portable computer such as a laptop computer, and which also fastens removably and securely to a readily available support stands such as photography tripods.

**[0014]** Figure 1 is a perspective view illustrating an adapter according to an embodiment of the invention, the adapter 100 placed under a laptop computer 150 as shown. The laptop computer 150, just before it is secured in place to the adapter 100, is shown in Figure 1. The LCD monitor 160 of the laptop computer is shown being folded for ease of placement and connection of the computer to adapter 100. Although in the particular implementation shown in Figure 1, the adapter 100 mates with a laptop computer, various implementations according to such embodiment of the invention provide adapters for different types of portable and handheld computers.

**[0015]** The adapter 100 includes a support plate having a bottom surface 120, as shown in Figure 1 and 2A, and a top surface 200 opposite the bottom surface, as shown in Figure 2B. A connector 110 is provided from the bottom surface for securing the adapter to a portable support stand, such as a collapsible support stand. Most preferably, the connector 110 is designed for mating with readily available collapsible support stands such as standard photography tripods and the like.

**[0016]** Photography tripods are typically designed to support and withstand equipment weighing in excess of 25 pounds. The heaviest laptops and other portable computers typically weigh less than 10 pounds. The adapter according to an embodiment of the invention cooperates with a standard photography tripod, allowing the tripod to serve as a stand for the computer, typically without any modification of the tripod. Equipment such as photography tripods are readily available and can be relatively easily transported to non-office environments including field locations where a supporting table is not available or when use from a standing position is preferred.

**[0017]** In an embodiment of the invention, the adapter 100 has slightly larger dimensions than the portable computer that it is designed to support. In an embodiment, one or more upwardly extending sidewalls on the front, left or right sides of the adapter are provided to further help guide the portable computer to a secure position on the adapter. Such sidewalls are desirably made short in order to avoid them from interfering with operation of various connectors, drives, switches, etc., that the sidewalls of portable computers typically house.

**[0018]** Figures 2A and 2B are bottom and top views, respectively, further illustrating an adapter according to this embodiment of the invention. As illustrated in Figure 2A, the bottom surface 120 of the adapter includes a connector 110 suitable for mating with a cooperating element of a standard photography tripod. In the implementation particularly illustrated in Figure 2A, the connector is placed in the center of the bottom surface 120.



**[0019]** The placement of the connector relative to the adapter can vary depending upon a number of factors. For example, the placement of the connector can be varied based on the expected use of the computer from a sitting or standing position affecting the angle made by the monitor screen to the base of the computer, the type of computer to be supported by the adapter, and whether the portable computer is to be tilted during use.

**[0020]** Desirably, for stability, the connector is placed in a location of the adapter which corresponds to the center of gravity of the portable computer when connected to the adapter 100 for use. In the particular implementation shown in Figure 2A, the connector is placed at the center of the bottom surface 120 where weight is typically centered when a portable computer is attached to the adapter 100 for use. On the other hand, depending on the use, one or a plurality of connectors can be provided, especially when the adapter is not to be mounted on a traditional tripod, such as a photography tripod.

**[0021]** In addition, a variety of connector designs can be used for providing a secure connection between the adapter and the tripod or other such supports. In Figures 3A and 3B, two examples of such connector designs are provided.

**[0022]** As provided in Figures 3A and 3B a threaded attachment 350 is provided to securely connect the adapter to a support such as a support stand. The threaded attachment 350 is provided in conjunction with two design alternatives, as illustrated in Figures 3A and 3B, respectively.

**[0023]** In Figure 3A, the adapter has a concave design as shown at 300 with a threaded aperture 300 for engagement by a cooperatively threaded stud of the tripod. By comparison, as illustrated in Figure 3B, a convex design is provided for the adapter, as shown at 310. In this case, a threaded stud 310 is attached for engagement with the tripod.

**[0024]** The connector of the embodiments provided in Figures 3A or 3B can be designed for use with a conventional tripod. In such a case, the tripod connector element of the adapter is the threaded attachment 300 or 310, as illustrated in Figures 3A and 3B. In this situation, to screw the adapter to the tripod, the cooperating threaded element of the tripod is positioned into the tripod connector at the base of the adapter. The threaded element of the tripod is then turned, preferably in a clockwise direction, although counter-clockwise arrangements are also possible. The alternative connector shown in Figure 3B functions in a similar manner.

**[0025]** Figures 3A and 3B illustrate a few examples of the possible embodiments for such connector design. A variety of factors can be altered to achieve desired results. In addition, and as stated earlier, even though the arrangements illustrated in Figures 1 through 3 provide for single connectors, multiple engageable connectors can be disposed in different areas of the adapter 100 to provide engagement with a variety of support structures, such as support stands.

**[0026]** Figure 2B provides a top view of the adapter 100. In Figure 2B, the top surface is shown at 200. The portable computing device, for example a laptop computer, can be placed directly on the top surface 200 of the adapter 100. The top surface 200 provides support for the placement of a portable computing device without need for further attachments to enable function. As illustrated in Figure 2B, enhancements in form of attachments are provided to connect the portable computing device to the adapter in a more secure fashion. The purpose of such attachments are to create a more stable connection between the computing device and the adapter.

**[0027]** A variety of designs can be used to provide such attachments. One example of such attachment is a latch or latches, which engages a corresponding secure keyhole of the computing device. The term "attachment", is used herein for ease of reference and can include a variety of latches and other attachments ranging from a simple slot or hole to a plurality of ridges and pivots, and other configurations generally shown at 240 in Figure 2B.

**[0028]** In an embodiment, these latches or attachments, as shown at 240 in Figure 2B, are especially designed to match the openings of a particular device such as a laptop computer.

**[0029]** Thus, attachments 240 are designed in a manner, such as shown in Figure 2B, to allow the portable computing device to be easily snapped in place to the adapter 100, before or after the adapter is connected to the support stand

or the photography tripod. The connector, in turn, makes the adapter engage easily with the support stand or tripod, whether or not already secured to the portable computing device.

**[0030]** It should be noted that the adapter as shown in Figures 2A and 2B, only provides for one possible embodiment of the present invention, while many other embodiments can be provided. For example, alternatives can be used to provide greater support for the portable computing device. It is even possible that such enhancement, if not specifically designed for use with a photography tripod, can enable the adapter to support weights greater than that of a portable computing device, such as a traditional computer or even a television, if an appropriate stand is used in conjunction with such adapter. In such an instance, the design of the support plate of the adapter is enhanced. Such enhanced support plate for the adapter can also reduce the risk that an attached portable computing device will be knocked over when placed on a tripod or other supporting stand.

**[0031]** Whether used in conjunction with a photography tripod or not, in an embodiment, the size of the adapter is made much larger than the actual portable computing device as a platform for supporting computing devices of different sizes and/or to provide enhanced stability. Alternatively, the size of the adapter can be made much smaller than the portable computing device it is designed to support. In such a case, the adapter needs to be only large enough to provide

secure attachment to the computing device and to a support such as a support stand, e.g., a tripod.

**[0032]** As illustrated in Figure 2C, an adapter 250 is provided in which the connector 210 for the adapter is provided on a side 260 of the adapter 250. Such a design will be best suited for mounting the adapter on a wall or other vertical surfaces. The connector 210 used in the embodiment of Figure 2C can be similar to the connectors discussed in Figure 3A and 3B or may be custom made to provide for a wall mounting or other connections as desired. An arrangement having a single connector is illustrated in Figure 2C, but multiple connectors can be provided.

**[0033]** As illustrated in Figure 2C, as before, a top surface 270 of the adapter itself can be used directly to provide a support surface. Enhanced attachments 240 are provided, the same as those described above with respect to Figure 2B, to secure the portable computing device to the adapter 250.

**[0034]** In yet another embodiment, an enhanced adapter is provided that functions like a docking station or a port replicator. The size and features of such an adapter can be designed specifically for a particular use, such as a laptop computer, or for more general purposes such that it can be used with a variety of portable computing devices.

**[0035]** An embodiment of such adapter 400 is illustrated in the front and rear perspective views of Figures 4A and 4B. As shown in Figure 4A, in this

embodiment, like the embodiments shown and described above with respect to Figures 1 and 2A-2B, the adapter 400 includes a support plate 402 having a top surface 404 and a bottom surface opposite the top surface. From the support plate, one or more connectors are provided from the bottom surface (not shown) for securing the adapter 400 to a support stand such as a tripod. Such connectors are shown and described above with respect to Figures 2A, 3A and 3B. Provided from the support plate are one or more attachments 440, e.g. latches, for the purpose of securing a computing system to the adapter 400. In a preferred embodiment, the adapter 400 includes a latch which is engageable with the secure keyhole that is provided on the laptop computer. The engageable latch can include a variety of specially designed ridges, pivots and other configurations, as described above with respect to Figure 2B, to enable secure attachment with a secure keyhole or other cooperating element of the computing device.

**[0036]** The adapter 400 includes interior electrical connectors 410. Such connectors are provided for the purpose of connecting the adapter to one or more of the following connectors of the portable computing system: without limitation, for external monitor, keyboard, mouse or other pointing device, printer, network, modem (telephone), serial interface, parallel interface, universal serial bus (USB), diskette drive, audio line-in, audio line-out and power input (AC adapter).

**[0037]** The interior electrical connectors are provided at an appropriate position and orientation for mating with a portable computing system. For example, when the portable computing system provides electrical connectors on a rear sidewall thereof, the electrical connectors of the adapter 400 are provided on a cooperating surface of the adapter, which can be a forward-facing sidewall 420 provided at the rear of the adapter 400, as shown in Figure 4A. In addition, or alternatively to providing connectors at the rear of the adapter 400, one or more connectors can be provided on a bottom surface of the adapter 400, such as may be located in the area where the attachments 440 are located.

**[0038]** As shown in Figure 4B, exterior electrical connectors 430 are provided from a rear surface 404 of the adapter. The exterior electrical connectors are coupled to the interior electrical connectors to provide pass-through function between the rear surface 404 of the adapter and a portable computing system when connected to the interior electrical connectors. The exterior connectors are sized and disposed to mate with cables, "cable" being defined herein as a current-carrying article having two or more insulated conductors. Such cables can include those provided for a computing system for carrying current(s) to support the functions: without limitation, of monitor, keyboard, mouse or other pointing device, printer, network, modem (telephone), serial interface, parallel interface, universal serial bus (USB), diskette drive, audio line-in, audio line-out, and power input (AC adapter).

**[0039]** An advantage of such embodiment is that the cables needed to connect the laptop computer for additional functions, e.g., for networking function, printer, AC adapter, audio in/out, etc., can be attached to the adapter, and not directly to the laptop itself. In such manner, cumbersome wiring is avoided when the laptop and adapter are attached to a support stand such as a tripod. Also, it simplifies removal of the laptop from the adapter and support stand for transport to another location, and reinstallation when the stand is needed again.

**[0040]** In addition, the particular design enables the user not to be forced to purchase a variety of laptop accessories that are difficult to attach and expensive to retrofit. Other advantages of an adapter that also functions as a docking station or a port replicator may be the addition of other built-in features or support wireless connections.

**[0041]** In embodiments of the invention, the adapter is lightweight and thin and can be transported easily with the portable computing device, for example, such as the case for a laptop computer.

**[0042]** In an alternative embodiment, the adapter can even be designed to be left permanently in place under the portable computing device, such as a laptop computer, at all times if desired, to provide for ease of transport. Since the adapter is relatively thin and lightweight, it enables the user to pack the device



and the adapter in a carrying case provided for the portable computing device with ease.

**[0043]** Embodiments of the adapter enable a computing device, especially portable computing devices such as laptop computers, to be supported in a secure manner by readily available support stands such as photography tripods. Alternative embodiments allow for mounting to vertical surfaces and other structures. The adapter is transportable with ease either by itself, or in a carrying case as attached to a portable computing device.

**[0044]** While the invention has been described in accordance with certain preferred embodiments thereof, those skilled in the art will understand the many modifications and enhancements which can be made thereto without departing from the true scope and spirit of the invention, which is limited only by the claims appended below.